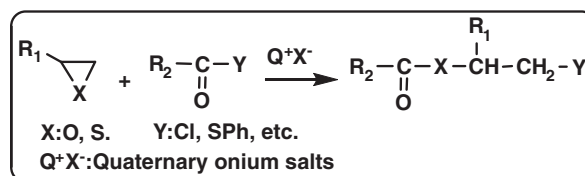


REVIEW ARTICLE

Novel Synthesis of Polymers with Well-Defined Structures Based on Selective Reaction of Cyclic Sulfides and Cyclic Ethers Catalyzed by Quaternary Onium Salts

Novel syntheses of polymers with well-defined structures were developed based on the selective reactions of thiiranes and oxiranes with carboxylic esters catalyzed quaternary onium salts. Polymers with pendant chloromethyl groups were synthesized by polyaddition of difunctional thiiranes or oxiranes. Acyl-transfer polymerization of thiiranes was successfully developed. Alternating ring-opening polymerizations of oxiranes with γ -thiobutyrolactone, or of oxetane with cyclic carboxylic anhydrides were also developed. Sequence-ordered polymers were synthesized by transformation of polymer backbones of poly(*S*-thioester).



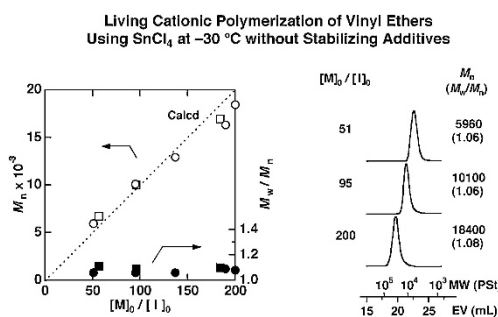
- Polymerization forming pendant reactive groups
- Acyl-transfer polymerization
- Transformation of polymer backbones

A. KAMEYAMA and T. NISHIKUBO
Vol. 41, No. 1, pp 1–15 (2009)

SHORT COMMUNICATION

Living Cationic Polymerization of Vinyl Ethers Using a Strong Lewis Acid without Stabilizing Additives: Effective Interaction of Monomers with Growing Ends and/or SnCl₄

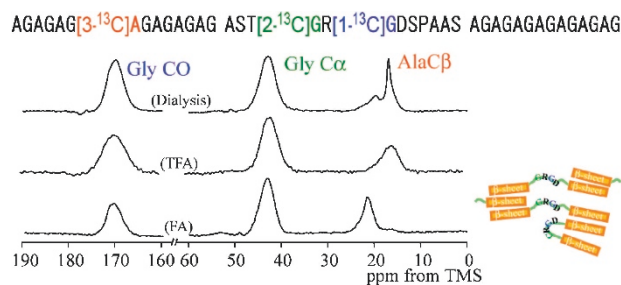
Cationic polymerization was examined with a strong Lewis acid in the absence of external additives, which stabilize carbocations and Lewis acids. Surprisingly, at -30°C , SnCl₄ induced living polymerization of isobutyl vinyl ether in toluene ($M_w/M_n \sim 1.1$). On the other hand, no living nature was observed with other Lewis acids even at -78°C . Both experimental results and computational chemistry suggested that a vinyl ether monomer stabilized a carbocation and a Lewis acid to realize living polymerization.



M. YONEZUMI, S. KANAOKA,
 S. OKUMOTO, and S. AOSHIMA
Vol. 41, No. 1, pp 16–17 (2009)

Structural Study of Silk-like Peptides Modified by the Addition of the Cell Adhesive Sequence, RGD, Using ¹³C CP/MAS NMR

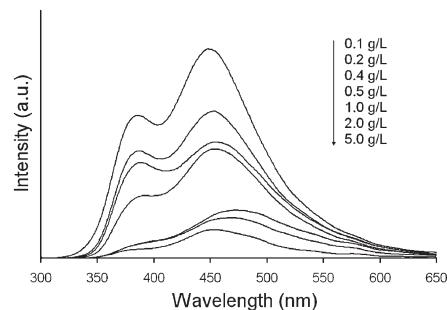
We synthesized the ¹³C-labeled peptides with the sequences (AAG)_{n1} or (AG)_{n2} in both N- and C-terminal parts and the cell-adhesive sequence, ASTGRGDSPAAS in the central part in order to obtain basic information to design the cell-adhesive silk-like proteins. The ¹³C CP/MAS NMR was used to characterize these structures in the solid states. One of the possible structures was shown.



C. TANAKA, A. ASANO,
 T. KUROTTSU, and T. ASAKURA
Vol. 41, No. 1, pp 18–19 (2009)

Fluorescent Hyperbranched Polyamine with *s*-Triazine: Synthesis, Characterization and Properties Evaluation

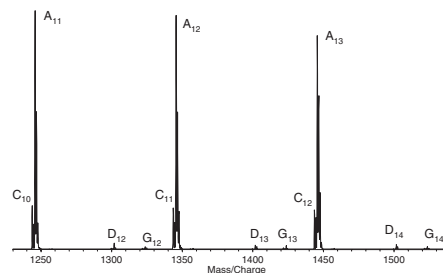
A hyperbranched polyamine with *s*-triazine unit has been synthesized. The fluorescence behavior of the polymer was investigated with respect to its nature of end groups, concentration, pH of the medium and presence of metal ion (Cu^{2+}).



S. S. MAHAPATRA and N. KARAK
Vol. 41, No. 1, pp 20–25 (2009)

Reassessment of Free-Radical Polymerization Mechanism of Allyl Acetate Based on End-Group Determination of Resulting Oligomers by MALDI-TOF-MS Spectrometry

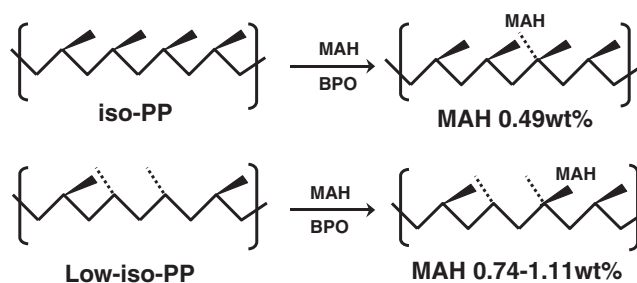
Allyl acetate (AAc) was polymerized radically and the resultant oligomeric poly(AAc)s were characterized using MALDI-TOF-MS spectrometry in order to reassess the classical AAc polymerization mechanism. The fate of resonance-stabilized monomeric allyl radical generated *via* monomer chain transfer of growing polymer radical was pursued in terms of the competition between the initiation of a new polymer chain and the chain stopping reaction of a growing polymer radical, respectively.



A. MATSUMOTO, T. KUMAGAI, H. AOTA,
H. KAWASAKI, and R. ARAKAWA
Vol. 41, No. 1, pp 26–33 (2009)

Preparation of Modified Low-Melting Point Polypropylene: Effect of Tacticity for Modification

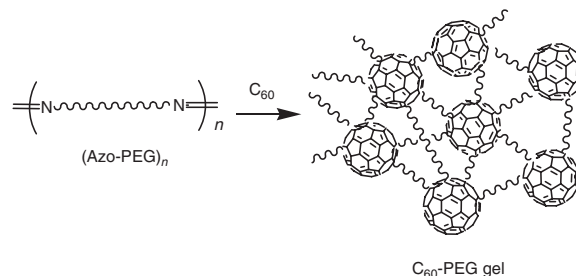
Low-melting point polypropylene with middle range of isotacticity was modified with maleic anhydride and acrylate monomers. The degrees of modification depend on the tacticity of base polypropylene. Isotactic polypropylene is most difficult to modify. From the difference of the polypropylene characters, various reaction temperature and radical initiators could be applicable.



R. ABURATANI, S. MACHIDA,
H. NAKASHIMA, and T. FUJIMURA
Vol. 41, No. 1, pp 34–39 (2009)

A Simple Preparation of C₆₀-Poly(ethylene glycol) Gel and its Properties

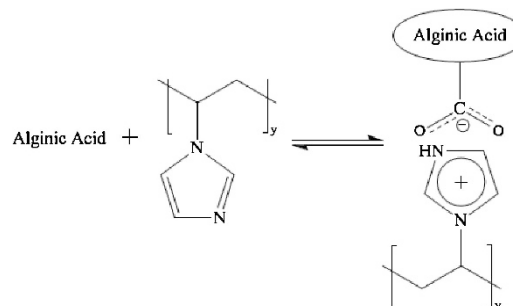
Poly(ethylene glycol) (PEG) biradicals formed by thermal decomposition of macroazo-initiator, (Azo-PEG)_n, were successfully trapped by C₆₀ fullerene to give C₆₀-PEG gel containing C₆₀ fullerene at cross-linked point. The reaction conditions to give highest gel fraction is summarized as follows: the feed molar ratio, 5 (mol/mol); concentration of C₆₀, 3.5 mmol/L; 70 °C; 24 h. C₆₀-PEG gel was swelled in water, methanol, and THF and degree of swelling were about 5.1 to 7.8. Breaking strength decreased with increasing the feed molar ratio.



H. WAKAI, T. MOMOI, T. YAMAUCHI, and N. TSUBOKAWA
Vol. 41, No. 1, pp 40–45 (2009)

The Synthesis of Complex Polymer Electrolytes Based on Alginic Acid and Poly(1-vinylimidazole) and Application in Tyrosinase Immobilization

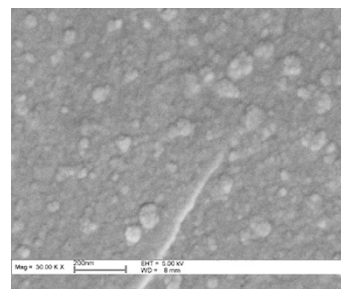
Complex polymer electrolyte networks consisting of alginic acid, AA and poly 1-vinylimidazole, PVI were prepared by mixing the polymers at several stoichiometric ratios. The materials were characterized by FT-IR and elemental analysis, EA. Enzyme entrapped polymer networks (EEN) were produced by immobilization of tyrosinase in the matrix during complexation. The maximum reaction rate V_{max} , Michaelis-Menten constant K_m , the temperature and pH optimizations, as well as operational stability and shelf life of the immobilized enzyme were investigated.



M. KARTAL, S. K. KAYAHAN,
A. BOZKURT, and L. TOPPARE
Vol. 41, No. 1, pp 46–50 (2009)

Study on Mechanical, Thermal and Electrical Characterizations of Nano-SiC/Epoxy Composites

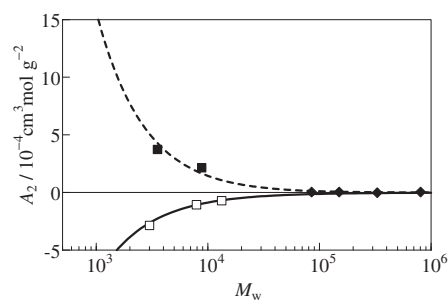
The effect of nano-SiC particles on mechanical, thermal and electrical properties of epoxy was studied by lap shear, TGA, DSC and electrical tests. The results showed that the addition of nano-SiC particles remarkably improves shear strength, dielectric constant and loss tangent, while slightly enhances thermal stability of epoxy. 8 vol. % silane treated nano-SiC/epoxy composite has the highest shear strength, good temperature independence of dielectric properties and enough volume resistivity, which meet the demand of some microelectronics materials.



T. ZHOU, X. WANG, M. GU, and D. XIONG
Vol. 41, No. 1, pp 51–57 (2009)

Effects of Chain Ends and Three-Segment Interactions on Second and Third Virial Coefficients of Four-Arm Star Polystyrenes

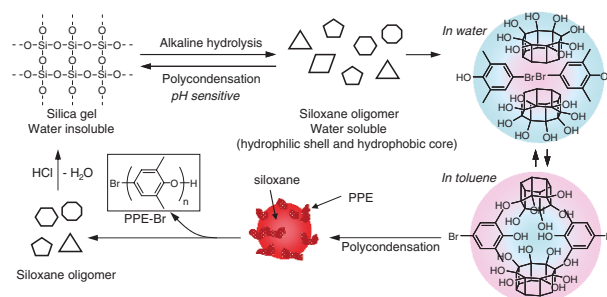
Second and third virial coefficients (A_2 and A_3 , respectively) for cyclohexane solutions (34.5 °C) of four-arm star polystyrene (4SPS) samples with a benzyl group at each arm end (4SPS-Bz) and 4SPS samples with a *sec*-butyl group at each arm end (4SPS-Bu) were determined as functions of weight-average molecular weight M_w . The negative A_2 for 4SPS-Bz (unfilled squares) reflects the effects of three-segment interactions, while the positive A_2 for 4SPS-Bu (filled squares) is due to the effects from arm ends.



Y. NISHI, Y. NAKAMURA, and T. NORISUYE
Vol. 41, No. 1, pp 58–62 (2009)

Biphasic Polycondensation of 4-Bromo-2,6-dimethylphenol Using Silica Gel as a Promoter

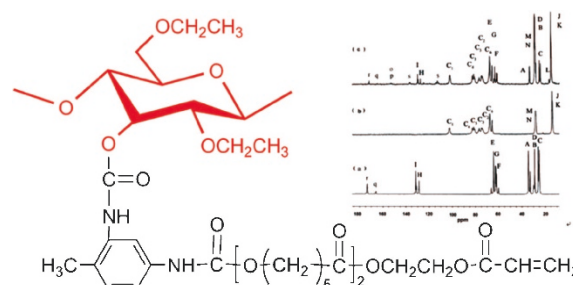
Poly(2,6-dimethyl-1,4-phenylene ether) (PPE) was successfully prepared by the biphasic polymerization of 4-bromo-2,6-dimethylphenol (BDMP) using silica gel as a promoter under air. Silica gel was alkaline hydrolyzed to afford water soluble siloxane oligomers, which acted as an effective phase transfer agent for the polymerization of BDMP. The pure PPE was easily separated by the ordinal reprecipitation process from the siloxane oligomers, which were then retransformed into silica gel by the condensation of the silanol groups in acidic medium.



Y. SHIBASAKI, M. TAKAHASHI, M. TANAKA,
J. N. KONDO, and Y. OISHI
Vol. 41, No. 1, pp 63–68 (2009)

Synthesis and Characterizations of Graft Copolymer of Ethylcellulose with Poly(caprolactone monoacrylate)

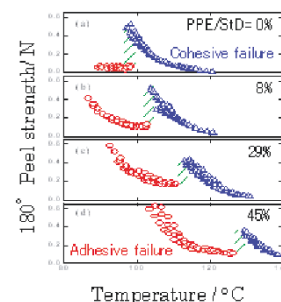
Ethylcellulose grafting polycaprolactone monoacrylate copolymer (EC-g-PCLA) was synthesized by a two-step reaction of ethylcellulose (EC) with poly(caprolactone monoacrylate) (PCLA). The flow temperature of graft copolymer was lower than that of the pure EC and decreased with increasing the grafting percentage. Outdoor soil burial and active sludge tests indicated that the graft copolymer has biodegradability in natural conditions.



D. WANG, C. CHEN, Y. XUAN,
Y. HUANG, and J. SHEN
Vol. 41, No. 1, pp 69–73 (2009)

Mechanical and Thermal Properties of a Hot-melt Adhesive of Triblock Copolymer Added with a Miscible Homopolymer

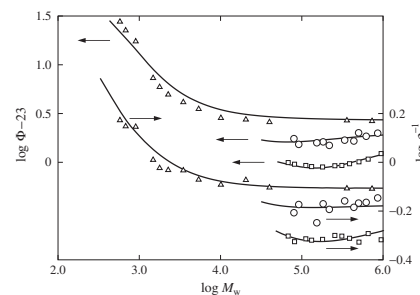
Adhesives made of a styrenic triblock copolymer with different content of a miscible homopolymer, PPE, have been examined by various methods. With SAFT and 180° peel test, the thermal resistance of adhesive performance was examined. By DMA and T-M DSC, the glass transition temperature of the styrene domain, $T_g(\text{StD})$, was examined. It has been confirmed that the thermal resistance depends on $T_g(\text{StD})$, which linearly increases with the added content of PPE in styrene domains.



H. KONDO and A. TODA
Vol. 41, No. 1, pp 74–82 (2009)

Transport Coefficients of Poly(diisopropyl fumarate) in Dilute Solution

The ratio Φ (Flory–Fox factor) of the hydrodynamic molar volume to the $3/2$ power of the mean-square radius of gyration $\langle S^2 \rangle$ and also the ratio ρ^{-1} of the hydrodynamic radius to $\langle S^2 \rangle^{1/2}$ of the poly(diisopropyl fumarate) in tetrahydrofuran at 30.0 °C (○) are found to lie between those for atactic polystyrene (△) and poly(*n*-hexyl isocyanate) (□).

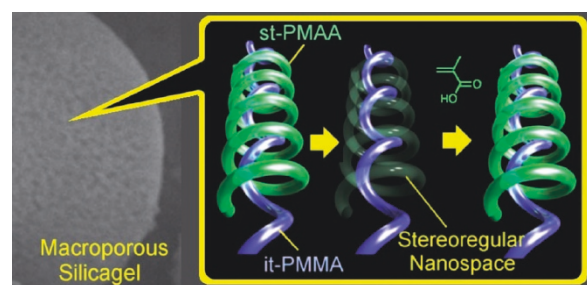


M. NAKATSUJI, K. SOUTOKU, M. OSA, and T. YOSHIZAKI
Vol. 41, No. 1, pp 83–89 (2009)

NOTE

Macroporous Silicagel Substrate for Stereoregular Template Polymerization of Methacrylic Acid Using Stereocomplex Assembled Thin Films

Macroporous silicagel (diameter: 7 μm, pore: 100 nm) was selected as a suitable substrate for the stereoregular template polymerization of methacrylic acid (MA) in the presence of isotactic poly(methyl methacrylate) (*it*-PMMA). A stereocomplex of *it*-PMMA and syndiotactic poly(methacrylic acid) (*st*-PMAA) was formed using Layer-by-layer assembly on macroporous silicagel. The subsequent extraction of the *st*-PMAA provided a porous *it*-PMMA thin film as a stereoregular, radical polymerization field for MA, and the reproducibility of this syndiospecific polymerization was confirmed.



H. AJIRO, D. KAMEI, and M. AKASHI
Vol. 41, No. 1, pp 90–93 (2009)